

Claims

1. A method of injection-molding plastic material articles consisting of a plurality of components, comprising the steps of:
  - a) providing an injection molding machine having a stack mold in which a center platen on a first side thereof cooperates with a first mold portion via a first separation plane and, on a second side thereof cooperates with a second mold portion via a second separation plane, said stack mold being provided with a plurality of first, smaller cavities as well as with a plurality of second, larger cavities;
  - b) temperature-controlling said stack mold differently in an area of said first separation plane and in an area of said second separation plane;
  - b) injection-molding of said first components of said plastic material article in said first cavities located in said first separation plane;
  - c) unmolding said first components from said first cavities;
  - d) transferring said first components from said first separation plane to said second separation plane;
  - e) placing said first components into said second cavities;

- f) injection-molding said second components on said first components within said second cavities; and
- g) unmolding said plastic material articles from said second cavities.

2. A method of injection-molding plastic material articles consisting of a plurality of components, comprising the steps of:

- a) providing an injection molding machine having a stack mold in which a center platen on a first side thereof cooperates with a first mold portion via a first separation plane and, on a second side thereof cooperates with a second mold portion via a second separation plane, said stack mold being provided with a plurality of first, smaller cavities as well as with a plurality of second, larger cavities;
- b) injection-molding of said first component of said plastic material article in a first cavity located in said first separation plane;
- c) unmolding said first component from said first cavity;
- d) transferring said first component from said first separation plane to said second separation plane;
- e) placing said first component into said second cavity;

- f) injection-molding said second component on said first component within said second cavity; and
- g) unmolding said plastic material article from said second cavity,

wherein said steps c), e) and g) are executed essentially independently one from the other.

- 3. The method of claim 2, wherein said stack mold is temperature-controlled differently in an area of said first separation plane and in an area of said second separation plane.
- 4. A method for injection-molding plastic material articles in an injection molding machine having a mold in which at least one first mold portion cooperates with at least one second mold portion via at least one separation plane, said mold being temperature-controlled differently in different areas of said at least one separation plane.
- 5. The method of claim 4, wherein said injection molding machine comprises a stack mold in which a center platen on a first side thereof cooperates with a first mold portion via a first separation plane and, on a second side thereof cooperates with a second mold portion via a second separation plane, said stack mold being temperature-controlled differently in an area of said first separation plane and in an area of said second separation plane.

6. The method of claim 5, wherein said stack mold is provided with a plurality of first, smaller cavities in said first separation plane as well as with a plurality of second, larger cavities in said second separation plane, said plastic material articles being injection-molded in said cavities.
7. A method of injection-molding plastic material articles consisting of a plurality of components, the method comprising the steps of:
  - a) injection-molding a first component; and
  - b) injection-molding a second component to said first component, wherein said second component essentially encloses said first component.
8. The method of claim 7, wherein said first component is essentially cylindrical, said second component surrounding said first component like a cylindrical jacket.
9. The method of claim 7, wherein said second component goes through said first component.
10. An apparatus for injection-molding plastic material articles consisting of a plurality of components comprising:
  - a) an injection molding machine having a stack mold in which a center platen on a first side thereof cooperates with a first mold portion via a first separation plane and, on a second side thereof cooper-

ates with a second mold portion via a second separation plane, said stack mold being provided with a plurality of first, smaller cavities as well as with a plurality of second, larger cavities, said stack mold in the area of said first separation plane and in an area of said second separation plane being provided with assemblies for different temperature-control;

b) means for injection-molding

- of said first components of said plastic material article in first cavities located in said first separation plane;
- of said second components on said first components within said second cavities; and

c) a handling system for

- unmolding said first components from said first cavities;
- transferring said first components from said first separation plane to said second separation plane;
- placing said first components into said second cavities; and

- unmolding said plastic material articles from said second cavities.

11. An apparatus for injection-molding plastic material articles consisting of a plurality of components comprising:

- a) an injection molding machine having a stack mold in which a center platen on a first side thereof cooperates with a first mold portion via a first separation plane and, on a second side thereof cooperates with a second mold portion via a second separation plane, said stack mold being provided with a plurality of first, smaller cavities as well as with a plurality of second, larger cavities;
- b) means for injection-molding
  - of a first component of said plastic material article in a first cavity located in said first separation plane;
  - of a second component on said first component within said second cavity; and
- c) a handling system provided with at least two arms adapted to be advanced into said first separation plane and into said second separation plane, respectively, essentially independently one from the other, for

- unmolding said first component from said first cavity;
  - transferring said first component from said first separation plane to said second separation plane;
  - placing said first component into said second cavity; and
  - unmolding said plastic material article from said second cavity.
12. The apparatus of claim 11, wherein said stack mold in an area of said first separation plane and in an area of said second separation plane is provided with assemblies for different temperature control.
13. An apparatus for injection-molding plastic material articles in an injection-molding machine comprising a mold in which at least one first mold portion cooperates with at least one second mold portion via at least one separation plane, wherein means are provided for temperature-controlling said mold differently in different areas of said at least one separation plane.
14. The apparatus of claim 13, wherein said injection molding machine comprises a stack mold in which a center platen on a first side thereof cooperates with a first mold portion via a first separation plane and, on a second side thereof cooperates with a second mold portion via a sec-

ond separation plane, said stack mold in an area of said first separation plane and in an area of said second separation plane being provided with means for differently temperature-controlling.

15. The apparatus of claim 14, wherein said stack mold is provided with a plurality of first, smaller cavities in said first separation plane as well as with a plurality of second, larger cavities in said second separation plane.
16. The apparatus of claims 10, wherein said handling system is provided with a robot having arms, said arms, when said stack mold is open, being adapted to be advanced into gaps between said center platen and said first and said second mold portion in a direction essentially perpendicular to an opening direction, said arms extending essentially in said direction of advancement.
17. The apparatus of claims 10, wherein a first arm adapted to be advanced into said first separation plane on one side thereof is provided with seats for first components, and a second arm adapted to be advanced into said second separation plane on both sides thereof is provided with seats for plastic material articles.
18. The apparatus of claim 17, wherein said second arm comprises two sub-arms, said seats of said second arm being located on opposite sides of said sub-arms.

19. The apparatus of claim 17, wherein a transfer station is provided for transferring said first components from said seats of said first arm into seats of said second arm.
20. The apparatus of claim 19, wherein said transfer station is adapted to be displaced in a direction perpendicular to sides of said arms.
21. The apparatus of claim 20, wherein in a rest position said transfer station is located adjacent said first arm, said first components being adapted to be transferred from said first arm to said transfer station.
22. The apparatus of claim 21, wherein after said transfer of said first components said first arm is adapted to be displaced out of a trajectory of said transfer station, said transfer station being adapted to be displaced into a position adjacent said second arm.
23. The apparatus of claim 17, wherein said robot is adapted to be rotated about a first axis extending parallel to an advancement direction thereof, such that after rotation said first arm is flush with said second separation plane and said second arm is flush with said first separation plane.
24. The apparatus of claim 23, wherein said second arm is adapted to be rotated about a second axis extending parallel to said advancement direction.

25. The apparatus of one or more of claims 10, wherein a conveyor is provided for carrying away said plastic material articles in an area of said second arm.
26. The apparatus of claim 25, wherein said plastic material articles are adapted to be transferred from said second arm to said conveyor on a side opposite said first arm.
27. The apparatus of claim 24, wherein said plastic material articles are adapted to be transferred from said second arm to said conveyor on a side facing said first arm.